

Management Approaches to Nonpoint Source Pollution Problems

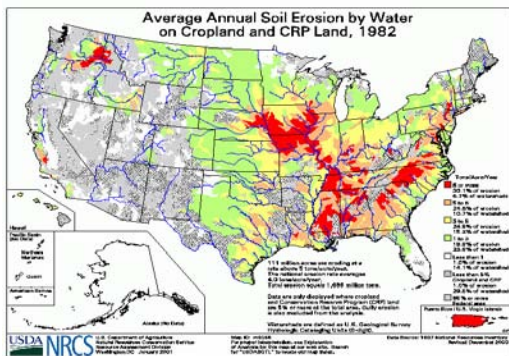
Agriculture
Timber Harvest
Urban Impacts
Stream Restoration

Controlling agricultural impacts

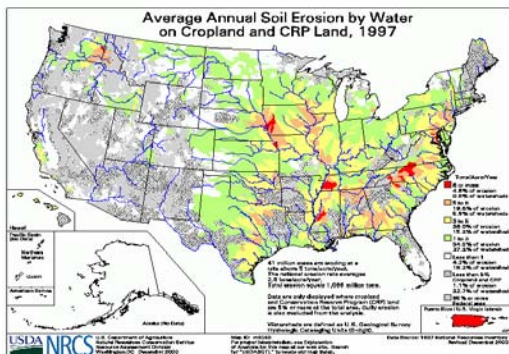
- Install/protect stream buffers
- Keep drainage ditches in grass
- Control sedimentation & erosion
- Follow contour for row crops
- Plant hay/grass strips
- Use conservation tillage
- Target fertilizer/chemical inputs
- Manage manure & wastes
- Keep livestock away from streams

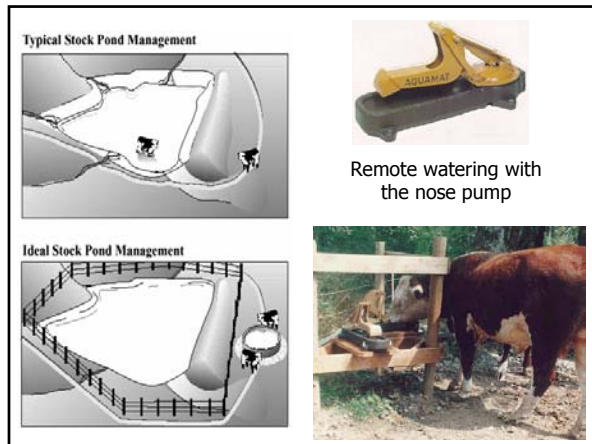


Soil erosion rates – 1982



Soil erosion rates - 1997








Timber Harvest BMPs

- Streamside Management Zones
- Haul Roads
- Log Decks
- Skid Trails
- Stream Crossings
- Site Preparation
- Revegetation of Bare Soil
- Preharvest Planning



Preharvest Planning

- Written plans help us remember to consider all factors
- Minimizes miscommunication
- Written plans are easier to share with others
- Matches harvesting system to the site conditions
- Minimizes roads, trails, and landings
- Reduce harvesting costs



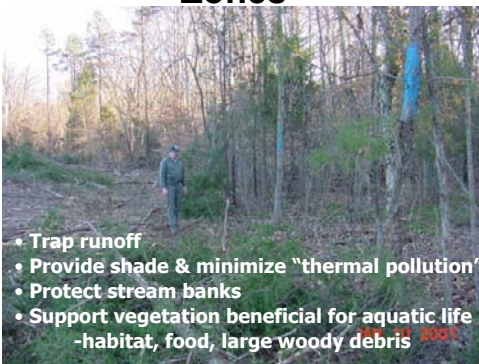
Failing to Plan is Planning to Fail !!

Preharvest Planning

- Study maps and do "on the ground" reconnaissance
- Identify and mark streamside mgmt zones (SMZs)
- Locate and flag log decks
- Locate highway entrances
- Locate haul roads and primary skid trails
- Locate and mark stream crossings
- Specify stream crossing structures
- Specify tract "close-down" requirements



Streamside Management Zones



- Trap runoff
- Provide shade & minimize "thermal pollution"
- Protect stream banks
- Support vegetation beneficial for aquatic life
 - habitat, food, large woody debris

Haul Roads

- Construct on grades of less than 10-15 percent
- Use Broad Based Dips that are designed for continuous use
- Non-erodible running/skid surfaces needed in SMZ and at stream approaches



Broad-Based Dip

- Prevents runoff & rutting along roads
- Created over a distance of about 35 feet
- Outslope the bottom of the dip about 3 percent
- Bottom of the dip should have flow energy dissipator (rock, brush, etc.)



Controlling Runoff

Broad-based dip. An alternative: Install culvert for cross drainage.

Similar to water bar construction is this ditch that diverts water away from the road cut.



Stream Crossings

- Cross at right angles
- Temporary bridges are preferred over culverts and fords
- Approaches should be straight
- Stabilize approaches



Culvert Installation



Figure C-6a. Use riprap around the inlet of culverts.



Figure C-6b. Use geotextile filter fabric for permanent installations. (Adapted from Wisconsin Department of Natural Resources, 1999.)



Skid Trail Stabilization

- Water bars most commonly used on temporary trails
- Install water bars at a 30 to 45 degree angle downslope
- Number needed depends on steepness of slope
- Have an outlet so runoff can disperse onto the leaf litter
- If greater than 5% slope, seed and mulch



Revegetation

- Recommended on all slopes exceeding 5% or on any highly erodible soil
- Install all structures prior to seeding
- Mulch is often needed for poorer soils and dry weather
- Fertilize & lime if needed
- 70% vegetative cover is our goal



Pollutants in Urban Runoff

- Sediment from development and new construction
- Oil, grease, and toxic organic chemicals from vehicles
- Viruses and bacteria from failing septic systems and pet-waste runoff from streets
- De-icing salts from roads
- Heavy metals (copper, lead, cadmium, chromium)
- Fertilizer and pesticides from lawns and gardens



Conservation design approaches

- Planning-Level Tools
 - Open Space Conservation
 - Critical Areas Conservation
 - Brownfields Redevelopment
 - Clustered Development
 - Low Impact Development
- Site-Level Tools
 - Tools that Promote Infiltration
 - Erosion and Sediment Controls
 - Constructed Wetlands
 - Filter Strips and Vegetated Buffers
 - Decentralized Wastewater Treatment Systems









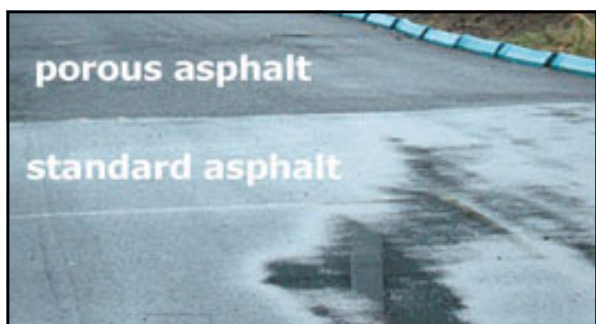


Runoff Storage Filtration

Redirecting rooftop runoff into vegetated areas will slow down the flow of water, reduce runoff, and increase groundwater recharge.

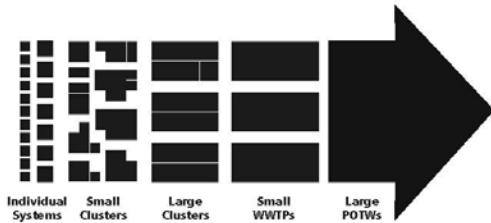


The breaks in the curb surrounding this parking lot allow runoff to naturally infiltrate into surrounding soil rather than directing it toward the storm drain.



Pervious or porous pavement can increase soil infiltration of storm water with the right soil conditions. Proper design & maintenance is necessary to keep fines from sealing porous surfaces and cause ponding—effectively turning porous pavement to another impervious surface.

Wastewater Management Continuum



Newer technologies = better effluent quality



Cleaner effluent



Textile Filter



Intermittent Sand Filter



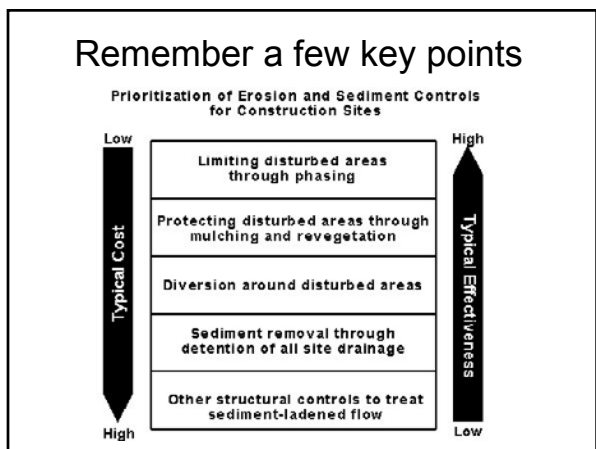
Recirculating Sand Filter

Typical erosion rates

- Forest land: 1 ton/acre/year
- Farm land: 15 +/- tons/acre/year
- Construction sites: 200+ tons/acre/year







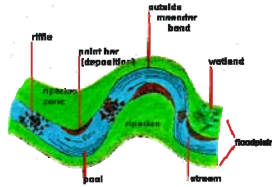
How much does mulch and grass help?

Cover material	Coverage rate	Erosion reduction
Hay or straw	1 ton/acre	87 percent
Hay or straw	2 tons/acre	98 percent
Grass	40 percent cover	90 percent
Grass	90 percent cover	99 percent
Erosion blanket	All bare ground	95-99 percent

Stream stabilization & restoration

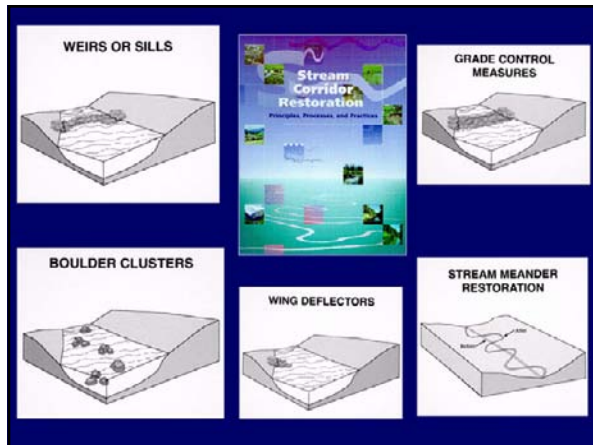
- Attempt stabilization/recovery

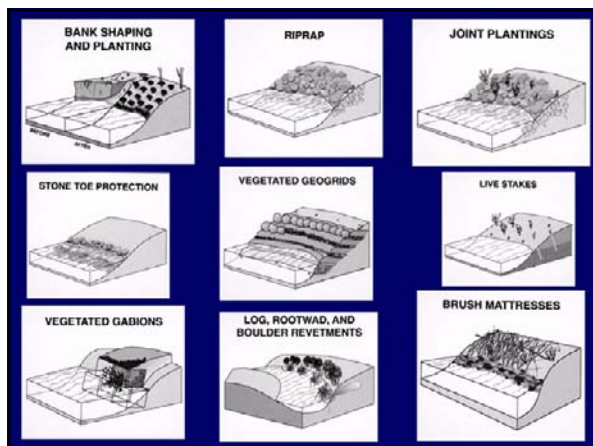
- Address flow changes
- Reduce pollutant loads
- Stabilize eroding banks
- Promote natural recovery



- Restore stream

- ID reference conditions
- Calculate flows
- Select desired channel profile, pattern, & dimensions
- Design and construct restoration project
- Implement post-project monitoring and management





Live Stakes / Brush Mattress









Measuring progress

- What are you trying to do?
- Can you measure that directly?
- How long will improvements take?
- Are there other things you can measure in the meantime?
- What are they, and why are they important?



LOGIC MODEL: Program Performance Framework

